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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/743,379 | 12/23/2003 | Kazuyoshi Chikugo | ASAIN0135 | 6961 |
| 24203 | 7590 | 07/06/2007 | | |
| GRIFFIN & SZIPL, PC SUITE PH-1 2300 NINTH STREET, SOUTH ARLINGTON, VA 22204 | | | EXAMINER KEMMERLE III, RUSSELL J | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/743,379

Applicant(s)

CHIKUGO, KAZUYOSHI

Examiner

Russell J. Kemmerle

Art Unit

1731

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 5-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 5-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 21 June 2007 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5-6 and 11-12 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "smoothly" in claims 5 and 11 is a relative term that renders the claim indefinite. The term "smoothly" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Art Unit: 1731

Claims 1, 2, 5-7 and 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vail (Ceramic Structures by Selective Laser Sintering of Microencapsulated, Finely Divided Ceramic Materials) in view of Osawa (US Patent 5,702,501) and Kaneko (US Patent 3,919,755).

Vail discloses a method of selective laser sintering a polymer coated ceramic powder in order to form a ceramic green article (i.e., powder lamination) (pp 125-126), and infiltrating the green article with a ceramic cement and then firing the infiltrated green article (page 126). Specifically mentioned is the use of oxide ceramics (specifically silica, zircon and alumina) (pg 125). Vail further discloses using a ceramic cement that is primarily colloidal silica, or a silica/alumina mixture (page 125 and Table 3). Colloidal silica and alumina is known to be an inorganic binder (see for example, Baek, US Patent 6,444,600, Col 1 lines 61-63 using colloidal silica and alumina as an inorganic binder).

Vail further discloses that after infiltrating the sample with ceramic cement, the samples are dried, polymer binders are removed, and infiltrated samples are fired at high temperatures up to around 1000°C (page 126 and Fig. 1).

Vail does not disclose that the samples are fired in an atmosphere of 1100°C or more, or that the impregnated core is placed in a heat resistant powder during firing.

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method disclosed by Vail of firing infiltrated oxide ceramic articles at 1000°C by firing the samples at 1100°C or higher. This would have been obvious because one skilled in the art would know that while 1000°C is

Art Unit: 1731

generally sufficient for treatment of a silica sol as discussed in Vail, for other materials such as alumina sol a temperature of at least 1100°C is required to convert the sol to α -alumina (see for example, Gonczy, US Patent 4,615,875 Col 4 lines 58-60 disclosing that unseeded alumina sol must be heated to 1200°C to effect phase transformation to α -alumina).

Osawa discloses a method of burying an article in a ceramic powder during heating and sintering to prevent the article from deforming (Col 2 lines 23-44).

Neither Vail nor Osawa disclose that the impregnation occur in a pressure reduced vessel.

Kaneko discloses a method of infiltrating a ceramic article with colloidal silica (see example 2, Col 3 line 10-Col 4 line 5), including where the impregnation occurs in a vacuum (i.e., a reduced pressure) (Col 2 line 31).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method taught by Vail of using selective laser sintering to form a ceramic article, by using the method disclosed by Osawa of firing an article while it is buried in a ceramic powder in order to prevent the article from deforming during firing. It would have been further obvious to have perform the impregnation step in a vacuum (i.e., in a reduced pressure vehicle) as taught by Kaneko, since Kaneko discloses that such a process is known, and that by impregnating in a vacuum it is known that more air can be removed from the molded object, allowing better impregnation by the liquid.

Art Unit: 1731

Referring to claims 6 and 12, it is known that the amount of time required to complete an impregnation step is dependant on many factors, including, but not limited to, the size of the article to be impregnated, the viscosity of the impregnating liquid, the force applied pulling the liquid into the article (i.e., how much the pressure in the vessel is reduced), and the degree of impregnation desired among other factors. It would be within the knowledge of one of ordinary skill in the art to manipulate such parameters in order to complete the impregnation step in about 5-10 minutes.

Claims 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vail in view of Osawa and Kaneko in further view of Gartland (US Patent 4,986,333).

Vail, Osawa and Kaneko are relied upon as discussed above, but fail to teach where the ceramic core is confined in wax, and a heat-resistant shell is then formed around the ceramic core confined in wax.

Gartland discloses a mold having a core to be used in metal casting. Making the mold involves first forming a ceramic core (similar to the core discussed above) which is then encased with wax, with a ceramic (i.e., heat-resistant) shell then formed around the wax (Col 2 lines 6-14).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method taught by Vail in view of Osawa and Kaneko as discussed above by taking the ceramic core formed and encasing it in wax, then further surrounding a ceramic shell around the encased core as taught by Gartland. This would have been obvious because Gartland discloses that this is a known and effective method of using a ceramic core to cast a metal object.

Response to Arguments

Applicant's arguments filed 21 June 2007 have been fully considered but they are not persuasive.

Applicant first argues that a *prima facie* case of obviousness has not been established because the previously cited references fail to teach the newly added limitation that "the oxide ceramics reinforcing liquid is impregnated in a pressure reduced vehicle" as recited in claims 1 and 9. This limitation has been addressed above by the addition of Kaneko and thus this argument is considered moot.

Applicant next argues that Vail fails to teach: (1) "sintering the impregnated ceramic core in an atmosphere at 1100 degrees centigrade or more", (2) "the impregnated ceramic core is placed in heat-resistant powder to prevent the impregnated ceramic core from deforming", or newly added limitations (3) "the oxide ceramics reinforcing liquid is impregnated in a pressure reduced vessel", (4) "the ceramics reinforcing liquid is an inorganic binder, and during impregnation of the ceramic core the inorganic binder smoothly replaces air in the ceramic core", (5) "impregnation of the ceramic core with inorganic binder occurs over about 5 to 10 minutes", (6) "confining the ceramic core in wax and then forming a heat-resistant shell around the ceramic core confined in wax".

All six of these limitations were addressed above in the rejections under 35 USC §103 of their respective claims, so while not specifically taught by Vail, each of these limitations was addressed above by at least one of the cited references.

Applicant next argues that Osawa does not teach or suggest limitations 1, 2, 3, 4 or 6 as listed directly above. Again, each of these limitations was addressed in a rejection under 35 USC §103 incorporating Osawa as a secondary reference used to teach limitation 5 listed above.

Applicant next argues that the Gonczy patent is unrelated to the current invention since it "does not pertain to any kind of ceramic and has no relevance to the subject matter of the claims of the above-captioned application. Instead, the Gonczy Patent pertains to processing alumina to make substrate chips for circuitry substrates used on computers, switches and calculators (col. 1, lines 6-12)" (Remarks filed 21 June 2007, page 11).

Gonczy was relied upon to show that it is known that when using an alumina sol as an impregnation liquid the impregnated article must be heated to above 1100°C, specifically Gonczy teaches heating to around 1200°C to effect a phase transformation to α -alumina. Alumina is a common name for aluminum oxide (Al_2O_3), a common ceramic material in industrial use, of which the α -phase is a common form. Thus Gonczy is directed to a method of heat treating an alumina (ceramic) impregnating liquid after it has been impregnated into a ceramic body in order to achieve the desired phase of that impregnated ceramic, and thus relevant to the current disclosure.

Applicant next argues that Langer fails to make up any of the deficiencies of the other cited references. Langer was used to address the limitations of now canceled claim 4, and thus is not used in a rejection of any of the currently pending claims.

Art Unit: 1731

As discussed above, Vail, Osawa and Gonczy, in combination with newly cited references Kaneko, Baek and Gartland, teach or suggest every limitation of the current claims, and thus establish a *prima facie* case of obviousness.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell J. Kemmerle whose telephone number is 571-272-6509. The examiner can normally be reached on Monday through Friday, 8:30-4:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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